

BRYOZOA FROM THE UPPER CARBONIFEROUS OF QUEENSLAND AND NEW SOUTH WALES.

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(Twelve Text-figures.)

[Read 27th October, 1948.]

INTRODUCTION.

The bryozoa described in this paper are collections from the Neerkol Series in Queensland and from a thin marine intercalation in the fresh-water Upper Kuttung Series in New South Wales.

The Neerkol Series of Upper Carboniferous age is extensively developed in the Rockhampton district of Queensland, and rocks believed to be of similar age occur at Mt. Barney, near the New South Wales-Queensland border; bryozoa from several localities in each of these areas are described in this paper, and some of the species described are common to both areas. No bryozoa have hitherto been described from the Neerkol Series, although their presence has been recorded by Reid (1930, 36-48) and others. Reid believed that some species of bryozoa from the Neerkol Series were identical with species from the Lake's Creek Quarry, also near Rockhampton. Study of the bryozoa from Lake's Creek Quarry has indicated that these beds are of Lower Permian age (Crockford, 1945, 125), and none of the species from the Neerkol Series described in this paper is identical with any species so far known from Lake's Creek.

In the districts immediately to the north of the Hunter River in New South Wales the Upper Carboniferous includes a thick series of fresh-water glacial and volcanic beds, the Upper Kuttung Series. Recently Dr. G. D. Osborne and a party of students from the University of Sydney found marine fossils on a narrow horizon in the Upper Kuttung Series at Stroud, this horizon being apparently a thin marine intercalation in the fresh-water beds. The marine fossils collected from this horizon include a number of bryozoa, and these species are described in this paper. Two of the species occurring on this horizon in the Upper Kuttung are identical with species occurring both at Mt. Barney and in the Neerkol Series near Rockhampton. From this it appears that the Upper Kuttung Series is at least in part to be correlated with the Neerkol (p. 20).

No specimens of bryozoa were available for study from the Kullatine Series, the marine equivalent of the Upper Kuttung Series in the Manning R. district of New South Wales. Thick marine sediments of Upper Carboniferous age, the Emu Creek Series, are found in the Drake district of New South Wales, and are believed to represent a southern continuation of the Neerkol Series. Voisey (1936) has recorded abundant fenestrate bryozoa from horizons in this series. Material from this series in the collections of the Australian Museum was examined in the hope of finding bryozoans from this series for comparison with those found in the Neerkol, but unfortunately there seem to be no bryozoans amongst the collections.

My thanks are due to Dr. Dorothy Hill, of the University of Queensland for the loan of specimens from the Neerkol Series, and to Dr. G. D. Osborne for the specimens which he collected from the Upper Kuttung, and especially to Professor L. A. Cotton for the help which he has given me in enabling me to complete this paper.

DESCRIPTION OF SPECIES.

Order CYCLOSTOMATA Busk.

Family FISTULIPORIDAE Ulrich.

Sub-Family HEXAGONELLINAE Crockford.

Genus FISTULAMINA Crockford, 1947.

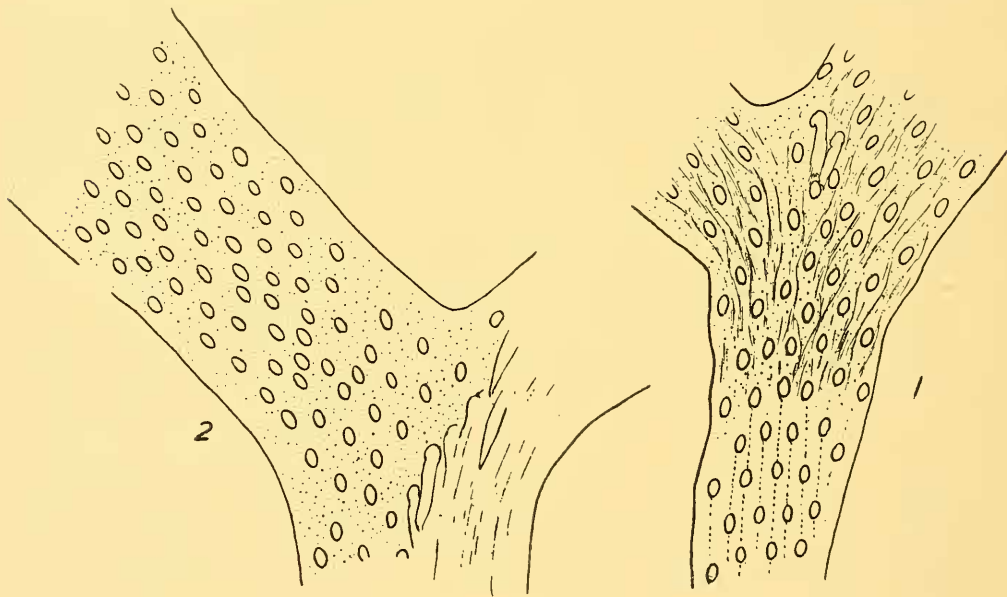
Fistulamina Crockford, 1947, 28.

FISTULAMINA FRONDESCENS, n. sp. (Text-figures 2, 2A).

Holotype: 7427, Sydney Univ. Colln.*Horizon and Locality*: Marine intercalation in the Upper Kuttung Series, Stroud.

Fistulamina with broad, rapidly and rather irregularly bifurcating bifoliate branches; zooecial apertures large, oval, in ten to eleven rows on each surface of the branches, and widely spaced.

The zoarium is bifoliate, consisting of broad, rapidly bifurcating, flattened branches, 3.5 to 4 mm. in width and only about 0.6 mm. in their greatest thickness. The colony reached a considerable size, the holotype being an incomplete specimen more than 7.5 cm. high. On each surface the branches bear normally 10 or 11 rows of large oval zooecial apertures, the number of rows increasing rapidly prior to bifurcation of the



Text-figures 1, 2.

Fig. 1.—*Fistulamina dispersa*, n. sp., weathered surface of the holotype, $\times 7$. The broken line in the lower part of this figure indicates the rows of zooecia.

Fig. 2.—*Fistulamina frondescens*, n. sp., weathered surface of the holotype, $\times 7$.

branch; there is a very narrow non-celluliferous margin along each margin of the branches. Bifurcation of the branches occurs in the plane of the mesial lamina, and successive bifurcations are usually but not always on opposite sides of the main stem. The distance between the bifurcations varies considerably from less than 5 to more than 12 mm. The zooecial apertures are oval, from 0.26 to 0.31 mm. long and 0.19 to 0.22 mm. wide; they are surrounded by thin peristomes, which are highest and most strongly developed on the proximal side of the aperture, the most strongly raised part being deflected slightly towards the closer edge of the branch. No lunaria could be distinguished with certainty, although in some cases the peristome does appear to be

curved to a slightly shorter radius on the raised side. The distance between the centres of successive apertures in the same row is about 0.8 to 1.05 mm., the apertures in the outermost rows being slightly more widely spaced than those in the central rows; in each row there are about 11 apertures in 10 mm. Where it is best preserved the surface between the apertures bears a few broad, shallow ridges and grooves, but these are readily worn away and the surface usually appears smooth.

The internal structure could be seen only on the weathered fracture surfaces of specimens, none of the material being suitable for sectioning. The zooecia are long and tubular, up to about 1.6 mm. in length; for the greater part of this distance they lie flatly along each side of the mesial lamina and then curve upwards to meet the surface very obliquely; occasional tiny vesicles appear to be developed close to the mesial lamina, and the space between the zooecia close to the surface was filled by dense tissue; there are no vertical plates developed between the rows of zooecia, such as those found in *Sulcoretepora*.

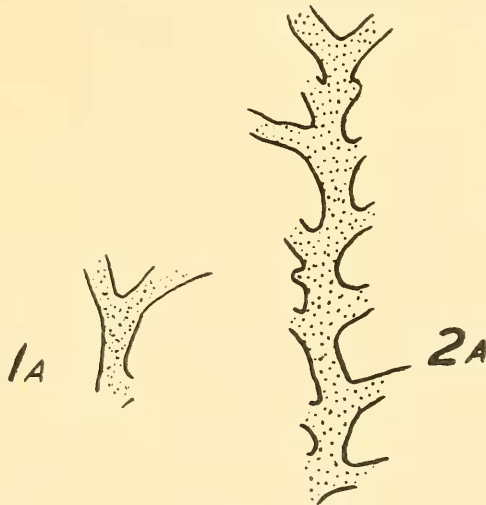
This species is a much coarser form than the species of *Fistulamina* previously described from the Burindi Series of New South Wales and the Viséan of Queensland; it is distinguished by its internal structure from species of *Sulcoretepora* of similar size.

FISTULAMINA DISPERSA, n. sp. (Text-figures 1, 1A.)

Holotype: F8928, Univ. Queensland Colln.

Horizon and Locality: Neerkol Series, Mt. Barney, Pors. 193-4, Par. Palen (holotype and F8924, Univ. Queensland Colln.); Neerkol Series, ridge above Lion Creek, Stanwell, near Rockhampton (F8913, Univ. Queensland Colln.).

Fistulamina with rather narrow, straplike bifoliate branches; zooecial apertures oval, widely spaced, in seven to nine rows on each surface of the branch; surface between the apertures striated.



Text-figures 1A, 2A.

Fig. 1A.—*Fistulamina dispersa*, n. sp., part of the holotype, $\times 1$.

Fig. 2A.—*Fistulamina frondescens*, n. sp., part of the holotype, $\times 1$.

The zoarium is bifoliate, consisting of narrow straplike branches about 2.6 to 3 mm. in width, which bifurcate at intervals of about 10 mm.; the branches are very thin compared with their width, their greatest thickness being about 0.5 mm. On each surface the branches bear 7 to 9 rows of zooecial apertures, the number of rows increasingly rapidly before bifurcation. The zooecial apertures are long and oval, about

0.26 × 0.17 mm. in diameter, and are surrounded by slight peristomes, which are more strongly raised on the proximal side of the aperture; lunaria do not appear to be developed. There are about nine apertures in 10 mm., the distance between successive apertures in the same row being from 1.0 to 1.2 mm. The surface between the apertures is ornamented by strong and sharp but fine ridges and grooves.

The internal structure is shown only on weathered surfaces of the specimens; the zooecia are long and tubular, up to 1.5 mm. in length; for the greater part of this distance they lie back to back along the mesial lamina, then bend upwards rather sharply to the surface, the curve to the surface being particularly sharp on the lower side close to the mesial lamina. No vertical plates occur between the rows of tubes, but a few small vesicles occur close to the mesial lamina; close to the surface the zooecia were separated by dense tissue, now usually removed by weathering.

The specimens from the ridge above Lion Creek appear identical with those from Mt. Barney except that their apertures are slightly more closely spaced; in their other characters the specimens from these two localities are so similar that they appear to belong to the same species.

Order TREPOSTOMATA Ulrich.

Family BATOSTOMELLIDAE Ulrich.

Genus *LEIOCLEMA* Ulrich, 1882.

Leioclema Ulrich, 1882, 14.

LEIOCLEMA ?, sp. indet.

The only batostomellid noticed in any of the specimens from the Neerkol or Upper Kuttung Series was a single very weathered specimen (on F8914, Univ. Queensland Colln., from ridge above Lion Ck.) of a thin batostomellid with large polygonal zooecia separated by numerous small polygonal mesopores, the abundance of which suggest that it is probably a species of *Leioclema*. It is here recorded to indicate the presence of this family in the Upper Carboniferous of Queensland.

Order CRYPTOSTOMATA Vine.

Family FENESTRELLINIDAE Bassler.

Genus *FENESTRELLINA* d'Orbigny, 1849.

Fenestrellina d'Orbigny, Bassler, 1935, 111.

FENESTRELLINA MALCHI, n. sp. (Text-fig. 4.).

Holotype: 10 on F8915, Univ. Queensland Colln.

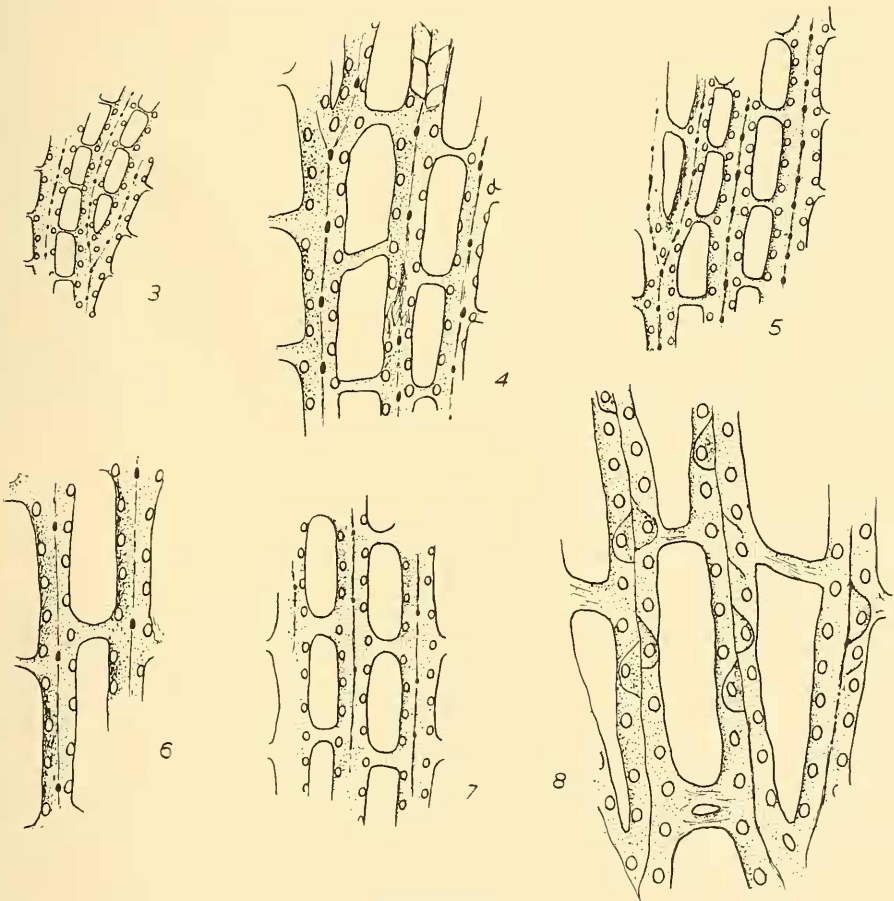
Horizon and Locality: Neerkol Series, Malchi Creek, Rockhampton district (holotype and 11, 11a. on F8915, 18 on F8916, Univ. Queensland Colln.); Neerkol Series, Mt. Barney, Pors. 193-4, Par. Palen (F8923, Univ. Queensland Colln.); Neerkol Series, Mt. Barney, Pors. 127v and 202, Par. Palen (F8932, Univ. Queensland Colln.); Marine intercalation in Upper Kuttung Series, Stroud (7429-32, Univ. Sydney Colln.).

Coarse Fenestrellina, with large rectangular fenestrules; four, sometimes three, zooecia to a fenestrule; carina high but not sharp, nodes large, high, and distant.

The zoarium is coarsely fenestrate, the branches and dissepiments being slender compared with the large rectangular fenestrules. There are 6 to 7 fenestrules in 10 mm., and usually between 14 and 18, but sometimes fewer, branches in the same distance. The branches are comparatively slender, generally between 0.32 and 0.44 mm., but sometimes up to 0.6 mm. in width; they bear two rows of zooecial apertures separated by a high but not sharply defined median carina, which bears a single row of large, high nodes. The nodes are usually elongated along their bases, and are widely spaced, 0.6 to 1.0 mm. apart; about 11 to 14 nodes occur in 10 mm. The zooecial apertures are small and round, 0.16 mm. in diameter; there are 4, rarely 3, apertures to a fenestrule; the distance between the centres of successive apertures is 0.37 to 0.5 mm., and there are about 23 apertures in 10 mm. The fenestrules are rectangular and are between

1.2 and 1.75 mm. in length and from 0.26 to 1.2 mm., but usually between 0.45 and 0.7 mm., in width; the width of the dissepiments is 0.1 to 0.22 mm., rarely to 0.3 mm. The dissepiments are rounded and are depressed below the level of the branches on the obverse surface; on the reverse surface both branches and dissepiments are smooth and evenly rounded. When the reverse surface of the branches is slightly weathered numerous very fine longitudinal striae are shown. The zooecia are rhomboidal to rather oval in outline, and the vestibules are sloping and meet the surface at an angle of about 45° .

There are two species described from Lake's Creek which show a general resemblance to this common Neerkol species, *Fenestrellina sparsa* Crockford and *F. rockhamptonensis* Crockford. This species is distinguished from *F. sparsa* by its rather smaller size and more regular habit of growth, the closer spacing of the nodes and the smaller fenestrules. *F. rockhamptonensis* has much larger nodes, which are rather more widely spaced and are more irregularly arranged than in this species, and it also has more closely spaced zooecial apertures and smaller fenestrules than *F. malchi*.



Text-figures 3-8.

Fig. 3.—*Fenestrellina micropora*, n. sp. Obverse surface of the holotype, $\times 10$.

Fig. 4.—*Fenestrellina malchi*, n. sp. Obverse surface of the holotype, $\times 10$.

Fig. 5.—*Fenestrellina osbornei*, n. sp. Obverse surface of the holotype, $\times 10$.

Fig. 6.—*Fenestrellina* cf. *malchi*. Obverse surface of a specimen (13 on F8915, Univ. Queensland Colln., from Malchi Ck.), which resembles this common Neerkol species except in the spacing of its nodes, which are more widely spaced. $\times 10$.

Fig. 7.—*Fenestrellina rectangularis*, n. sp. Obverse surface of the holotype, $\times 10$.

Fig. 8.—*Fenestrellina cincta*, n. sp. Obverse surface of the holotype, $\times 10$.

FENESTRELLINA OSBORNEI, n. sp. (Text-fig. 5.)

Holotype: On 7430, Univ. Sydney Colln.

Horizon and Locality: Marine intercalation in the fresh-water Upper Kuttung Series, Stroud (holotype and 7433-5, Univ. Sydney Colln.); Neerkol Series, ridge above Lion Creek, Stanwell (F8913-4, Univ. Queensland Colln.); Neerkol Series, Malchi Creek, Rockhampton district (21 on F8916, Univ. Queensland Colln.); Neerkol Series, Por. 2v, Par. Stanwell (F8920, 1, Univ. Queensland Colln.); Neerkol Series, Mt. Barney, Pors. 193-4, Par. Palen (F8926, Univ. Queensland Colln.).

Fine Fenestrellina, meshes fine and regular, three to four zooecial apertures to a fenestrule; carina slight, nodes in a single row, high and closely but rather irregularly spaced.

The zoarium is fenestrate and is fine-meshed, there being about 9 fenestrules and 15 to 18 branches in 10 mm. The branches are thin and straight, 0.28 to 0.39 mm. wide, and rarely bifurcate; they bear two rows of zooecial apertures, increasing to three only immediately before bifurcation. The carina is poorly developed, but there is a single row of high, prominent, spine-like nodes, closely but not very regularly spaced, their distance apart being 0.33 to 0.55 mm.; about 24 of these nodes occur in 10 mm. The zooecial apertures are round, about 0.14 mm. in diameter, and are surrounded by thin, rather high peristomes; there are 3 to 4 apertures in the length of each fenestrule and about 32 in 10 mm., the distance between the centres of successive apertures being 0.28 to 0.35 mm. The fenestrules are oval, 0.8 to 1.07 mm. long and about 0.21 to 0.43 mm. wide; the width of the dissepiments is 0.04 to 0.11 mm., and the length of one fenestrule and one dissepiment from 0.9 to 1.15 mm. The dissepiments are rounded and depressed below the level of the branches on the obverse surface; on the reverse surface both branches and dissepiments are smooth and evenly rounded and they are of about the same thickness. Where the reverse surface has been slightly weathered the backs of the branches are covered by very numerous fine longitudinal striae; the cells are rhomboidal in shape.

This common Neerkol species resembles in its general appearance the two most widespread species of *Fenestrellina* occurring in the Permian of eastern Australia, *F. fossula* (Lonsdale) and *F. dispersa* Crockford. It is, however, a larger species than either of these Permian forms, and differs also in the spacing of its zooecia and particularly in the spacing of the nodes.

FENESTRELLINA MICROPORA, n. sp. (Text-fig. 3.)

Holotype: A/F8913, Univ. Queensland Colln.

Horizon and Locality: Neerkol Series, ridge above Lion Creek, Stanwell (holotype and B/F8913, Univ. Queensland Colln.).

Very fine Fenestrellina, with two zooecia to a fenestrule, and with high, sharp, relatively wide-spaced nodes.

The zoarium is very finely fenestrate, there being about 20 fenestrules and 28 branches in 10 mm. The branches are straight, about 0.22 mm. in width, and bifurcate infrequently; they bear two rows of zooecial apertures, with three rows developed only immediately before bifurcation. The zooecial apertures are tiny, 0.09 mm. in diameter, and are surrounded by slight, thin peristomes. There are two apertures in the length of each fenestrule, one of these usually being placed at the end of a dissepiment and the other at the centre of the fenestrule. There are about 42 apertures in 10 mm., the distance between the centres of successive apertures being from 0.21 to 0.26 mm. There is a slight median carina between the two rows of apertures and this bears a single row of small, sharp, evenly spaced nodes; these nodes are placed from 0.28 to 0.32 mm. apart, and there are about 33 nodes in 10 mm. The fenestrules are from 0.45 to 0.55 mm. long and are about 0.17 to 0.22 mm. wide; the width of the dissepiments is 0.04 to 0.06 mm. The dissepiments are rounded and are depressed a little below the level of the branches on the obverse surface.

Numerous specimens of this tiny and distinctive species occur in the mudstones at the type locality of the Neerkol Series; its small size readily differentiates it from other species occurring in this series. Of species described from the Upper Palaeozoic

of Australia this form is most closely comparable with *Fenestrellina horologia* (Bretnall), which occurs in the Permian of Western Australia and Queensland. *F. horologia* is, however, a rather coarser species and has more widely spaced zooecial apertures and rather more closely spaced nodes than this form.

FENESTRELLINA CINCTA, n. sp. (Text-fig. 8.)

Holotype: F8919, Univ. Queensland Colln.

Horizon and Locality: Neerkol Series, Malchi Creek, Rockhampton district.

Very coarse Fenestrellina, six to ten zooecia to a fenestrule, slight carina with no nodes.

The zoarium is very coarsely fenestrate, there being 8 to 9 branches and about 2.5 fenestrules in 10 mm. The branches are straight and bifurcate rather rapidly; they are normally between 0.5 and 0.61 mm. wide, and bear two rows of zooecial apertures separated by a very slight ridge-like median carina; no nodes appear to have been developed. The zooecial apertures are large, about 0.18 mm. in diameter, and are surrounded by thin, high peristomes; many of the apertures were closed by a centrally perforated calcareous plate. The apertures are placed on the broad, flattened sides of the branches; frequently the zooecial apertures are placed in the centre of an oval depressed area, bordered by a thin and very distinct ridge. There are from 6 to 10 zooecia in a fenestrule, and about 19 in 10 mm., the distance between the centres of successive apertures being from 0.47 to 0.57 mm. The fenestrules are long, narrow, and irregularly shaped; they are normally from 2.2 to 4.6 mm. long, but occasionally a single very short fenestrule is developed; the width of the fenestrules is 0.6 to 1.05 mm., and the width of the dissepiments, which are transversely striate on the obverse surface, is about 0.19 to 0.3 mm. The dissepiments are depressed below the level of the branches on both obverse and reverse surfaces; on the reverse surface both branches and dissepiments are smooth and rounded. The zooecial cells are short, with sloping vestibules which meet the surface at about 45°.

This form resembles *Fenestrellina expansa* Crockford, from the Lower Permian at Lake's Creek, but has a more regular growth form with straight instead of flexuous branches, and has smaller and rather more closely spaced apertures and a slighter carina than *F. expansa*. The surface ridges around the apertures are a very distinctive characteristic of this species.

FENESTRELLINA RECTANGULARIS, n. sp. (Text-fig. 7.)

Holotype: 37 on F8924, Univ. Queensland Colln.

Horizon and Locality: Neerkol Series, Mt. Barney, Pors. 193-4, Par. Palen (holotype and 42 on F8927, 43 on F8929, Univ. Queensland Colln.); Neerkol Series, Malchi Creek, Rockhampton (25 on F8917, Univ. Queensland Colln.).

Fenestrellina with three to four zooecia to a fenestrule, nodes small and sharp, rather widely spaced.

The zoarium is fenestrate, with 8 to 9 fenestrules and about 14 branches in 10 mm. The branches are straight and rarely bifurcate; they are from 0.28 to 0.35 mm. in width and bear two rows of zooecial apertures separated by a distinct, sharp-sided, but not high carina, which bears a single row of small, sharp nodes spaced 0.6 to 0.78 mm. apart, there being about 15 of these nodes in 10 mm. The zooecial apertures are small and rounded, 0.1 to 0.15 mm. in diameter, and there are either 3 or more often 4 apertures to a fenestrule, and there are about 28 apertures in 10 mm., the distance between the centres of successive apertures being 0.3 to 0.41 mm. The fenestrules are rectangular, 0.9 to 1.25 mm. long and 0.35 to 0.5 mm. wide; the dissepiments are from 0.07 to 0.17 mm. in width, and the length of one fenestrule and one dissepiment is from 1.02 to 1.4 mm.

This small species, whose rectangular fenestrules and usually rather closely spaced branches give it a very characteristic regularly meshed appearance, is one of the most common species from Pors. 193-4, Par. Palen.

Genus POLYORA M'Coy, 1844.

Polypora M'Coy, 1844, 207.

POLYORA PUSTULOSA, n. sp. (Text-fig. 9.)

Holotype: 30/F8920, Univ. Queensland Colln.*Horizon and Locality*: Neerkol Series, Por. 2v, Par. Stanwell.*Fine Polypora, zooecia in three to four rows, with three to four apertures to a fenestrule; apertures pustulose, the surface between them depressed and without nodes.*

The zoarium is fenestrate and has a very regularly meshed appearance; in 10 mm. there are 8 fenestrules and 11 to 12 branches. The branches are slightly rounded on the obverse surface and bear three to four rows of zooecial apertures with two or three rows just after and four or five rows just before bifurcation, which occurs at rather distant intervals. The width of the branches is from 0.47 to 0.6 mm. where there are three and about 0.7 mm. where there are four rows of zooecia. There are 3 to 4 apertures to a fenestrule, the distance between the centres of successive apertures being 0.32 to 0.39 mm.; there are about 27 apertures in 10 mm. The apertures themselves are small and rounded, about 0.09 mm. in diameter; although they are surrounded by only slight, thin peristomes, each aperture is raised above the general surface of the branch so that the apertures are slightly pustulose and the surface between them a little depressed. The fenestrules are oval and regular in appearance; they are from 1.1 to 1.26 mm. long and 0.54 to 0.76 mm. wide, and the width of the dissepiments is from 0.15 to 0.22 mm.; the length of one fenestrule and one dissepiment is from 1.28 to 1.5 mm. On the obverse surface the dissepiments are evenly rounded and are usually depressed slightly below the level of the branches. The reverse surface was not shown. Very occasionally a large spherical surface cell of the type described by Ulrich in some Mississippian fenestrellids occurs behind an aperture; Ulrich doubtfully referred to these cells as ovicells and they occur occasionally in many species of Upper Palaeozoic fenestrellids.

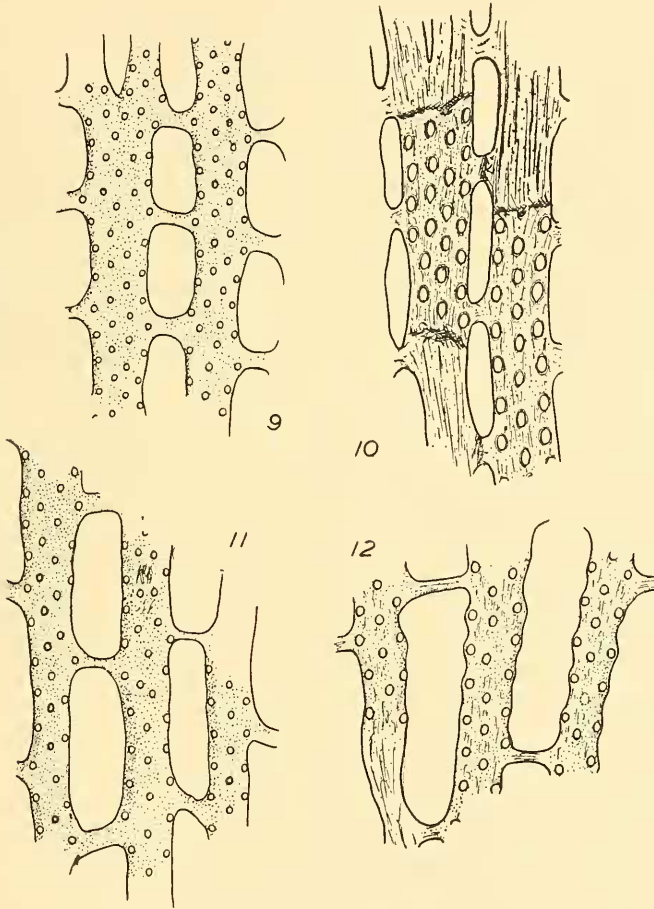
This species is differentiated from *Polypora woodsi* (Etheridge), which occurs in the Permian of New South Wales and Queensland and which it closely resembles in the general size of its zoarium, by having 3 to 4 rows of zooecia instead of regularly only 3 rows, and by the fact that it is the apertures themselves which give the pustulose appearance to the surface in this species, whereas in *P. woodsi* the apertures are depressed, and regular and strongly developed nodes upon the surface between the apertures give a pustulose appearance to the branches; no nodes are developed in this species.

POLYORA NEERKOLENSIS, sp. nov. (Text-fig. 10.)

Holotype: F8931, Univ. Queensland Colln.*Horizon and Locality*: Neerkol Series, Mt. Barney, Pors. 127v and 202, Par. Palen (holotype); Neerkol Series, Mt. Barney, Pors. 193-4, Par. Palen (F8926, Univ. Queensland Colln.); Neerkol Series, Por. 2v, Par. Stanwell (F8920-2, Univ. Queensland Colln.).*Coarse Polypora, with about six fenestrules in 10 mm.; zooecia in three rows; apertures large, three, sometimes four, to a fenestrule; surface ridged and grooved between the apertures, nodes absent.*

The zoarium is fenestrate and rather coarse meshed, there being 5.5 to 6 fenestrules and 8 to 10, rarely 12, branches in 10 mm. The branches are broad and are flattened on the obverse surface; they bear usually 3 rows of zooecial apertures, with 2 to 3 after and 4 to 5 rows before bifurcation, and sometimes with 4 rows for a long distance before bifurcation. The width of the branches is usually 0.54 to 0.67, rarely to 0.8 mm., where there are three rows of zooecia, and is about 0.45 mm. where there are two rows and 0.7 to 0.87 mm. where there are four rows. The zooecial apertures are large, 0.2 to 0.26 mm. long and 0.15 to 0.2 mm. wide, being oval or when well-preserved rather pyriform in outline; the peristomes are thin and slightly raised. There are 4, rarely 5, apertures in the length of each fenestrule, the distance between the centres of successive apertures being 0.35 to 0.52 mm.; there are about 24 apertures in 10 mm.

Nodes are not developed, the surface between the apertures being faintly pitted and marked by fine faint ridges and grooves. The fenestrules are oval, 1.1 to 1.8 mm. long and 0.24 to 0.87 mm. wide; the dissepiments are 0.17 to 0.4 mm. wide, the length of one fenestrule and one dissepiment being 1.3 to 1.9 mm. The dissepiments are rounded on the obverse surface and are slightly depressed below the level of the branches. On the reverse surface both branches and dissepiments are rounded and are rather coarsely granular, the dissepiments being thinner than the branches; where the outermost layer or the reverse surface is worn away the backs of the branches show numerous fine longitudinal striae; the zooecial cells are oval in outline on the basal plate.



Text-figures 9-12.

Fig. 9.—*Polypora pustulosa*, n. sp. Obverse surface of the holotype, $\times 10$.

Fig. 10.—*Polypora neerkolensis*, n. sp. Obverse surface of the holotype, $\times 10$.

Fig. 11.—*Polypora tenuirama*, n. sp. Obverse surface of the holotype, $\times 10$.

Fig. 12.—*Polypora palenensis*, n. sp. Obverse surface of the holotype, $\times 10$.

POLYPORA PALENENSIS, n. sp. (Text-fig. 12.)

Holotype: FS932, Univ. Queensland Colln.

Horizon and Locality: Neerkol Series, Pors. 127v and 202, Par. Palen (holotype and FS933, Univ. Queensland Colln.).

Very coarse Polypora, with three to four rows of zooecia and six to eight zooecia to a fenestrule; zooecial apertures very small.

The zoarium is coarsely fenestrate, there being about 3 fenestrules and 6 to 8 branches in 10 mm. The branches are straight and bifurcate rather rapidly; they are markedly rounded on the obverse surface and bear 3 to 4 rows of apertures, with 2 or 3 rows after and 5 to 6 rows just before bifurcation. The zooecial apertures are very small for the size of the zoarium, being 0.15 mm. in diameter. There are 6 to 8 apertures to a fenestrule, and about 24 in 10 mm., the distance between the centres of successive apertures being 0.37 to 0.47 mm. The fenestrules are rectangular, about 2.5 to 2.95 mm. long and from 0.65 to 1.0 mm. wide; the dissepiments are slender, 0.15 to 0.28 mm. in width. The dissepiments and branches are smooth and finely granular on the reverse surface, both being rather flattened.

POLYPORA TENUIRAMA, n. sp. (Text-fig. 11.)

Holotype: 15 on F8915, Univ. Queensland Colln.

Horizon and Locality: Neerkol Series, Malchi Creek, Rockhampton district (holotype and 12 on F8915, Univ. Queensland Colln.).

Coarse Polypora, with thin branches and dissepiments; zooecia in three to four rows on the branches, four to five apertures to a fenestrule; apertures slightly pustulose, stellate where well preserved.

The zoarium is coarsely fenestrate, the branches and dissepiments being slender for the number of rows of zooecia and the length of the fenestrules. In 10 mm. there are about 11 branches and 4.5 fenestrules. The branches are slightly rounded on the obverse surface and usually bear either 3 or 4 rows of zooecia, with two to three rows just after and either four or five rows just before bifurcation; the width of the branches is about 0.28 to 0.34 mm. where there are two rows of zooecia, increasing to 0.37 to 0.55 mm. where there are three and about 0.62 mm. where there are four rows. There are 4 to 5 zooecial apertures to a fenestrule and about 23 in 10 mm., the distance between the centres of successive apertures being 0.37 to 0.5 mm. The zooecial apertures are small, about 0.12 mm. in diameter; they are slightly pustulose, and when perfectly preserved they are surrounded by thin distinct peristomes and are stellate, about nine tiny radiating spines surrounding each aperture. No nodes appear to have been developed; the surface between the apertures is when well preserved ornamented by very fine longitudinal striae. The fenestrules are rectangular and are from 1.62 to 2.2 mm. long, being usually more than 1.85 mm. long, and they are from 0.32 to 0.76 mm. wide; the dissepiments are thin, 0.11 to 0.26 mm. in width, and are evenly rounded and slightly depressed below the level of the branches on the obverse surface. On the reverse surface both branches and dissepiments are smooth and rounded and they are of about the same thickness. The zooecial cells are oval in outline on the basal plate.

Family ACANTHOCLADIIDAE Zittel.

Genus PENNIRETEPORA d'Orbigny, 1849.

Penniretepora d'Orbigny, Bassler, 1935, 165.

PENNIRETEPORA, spp. indet.

Small fragments of *Penniretepora* occur in specimens from two localities in the Neerkol Series, from Malchi Creek in the Rockhampton district, and from Por. 2v. Par. Stanwell, also near Rockhampton. Although these fragments are too poorly preserved for any description, they are of interest in indicating the presence of this genus in the fauna.

DISTRIBUTION OF THE BRYOZOAN FAUNA.

The relative positions of the horizons within the Neerkol Series from which the Bryozoa described in this paper were collected is not known, and consideration of the distribution of the species here described unfortunately does not suggest any definite correlations between these different localities within the Neerkol Series. Their distribution is, however, significant in indicating that the two localities at Mt. Barney

are definitely of Neerkol age, and also in showing that the Neerkol Series is at least in part coeval with the top part of the Upper Kuttung Series. The Upper Kuttung and Kullatine Series in New South Wales contain abundant evidences of glacial activity, and tillites and varve-shales are of frequent occurrence within these series. Direct evidences of glacial activity are not known to occur in the Neerkol Series, and because of this it has at times been doubted whether the Neerkol is equivalent to any part of the Upper Kuttung. Bryozoa here described from Stroud were collected from an horizon within the main glacial zone at the top of the Upper Kuttung Series, this horizon being some 2,000 ft. below the top of the series; the fact that two of the species of Bryozoa occurring on this horizon at Stroud occur also in the Neerkol Series, both in the Rockhampton district and at Mt. Barney, indicates that at least a part of the Neerkol should be correlated with the Upper Kuttung.

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